

# PLC ITAG Endorsement Survey

## 1. Respondent Information

**August 5, 2022**

Please complete the survey online by Friday, August 26, 2022.

The purpose of this survey is to collect responses from Ohio public institutions of higher education regarding a proposed alignment and awarding of credit hours for the Industry Recognized Credential Transfer Assurance Guide (ITAG) for Programmable Logic Controllers (PLC). We are asking respondents to review the proposed ITAG template and evaluate the listed credentials' possible alignment to the learning outcomes for courses in this discipline taught at post-secondary institutions. The template lists in the left-hand column the learning outcomes from the Transfer Assurance Guide (TAG) PLC course. In the right-hand column are the competencies required to acquire the proposed credentials for ITAG credit:

- Siemens SCE Certificate in Automation and Certificate in Advanced Automation
- Rockwell Automation (Allen-Bradley) Logix Programmer Certificate
- Mitsubishi Electric PLC & HMI

If approved, the proposed ITAG would allow a student who passes the certification exam for any one of the three credentials listed above to transfer 3 credit hours to an Ohio public institution of higher learning towards a course covering the content of an introductory PLC course, regardless of where and how the student obtained the education to obtain the certification.

We ask that **one representative** complete this survey on behalf of your institution as soon as possible, but **no later than Friday, August 26, 2022**. Please share this survey with the person most familiar with the content and subject matter. Following statewide endorsement, a formal announcement will be sent out.

Rob Speckert, Miami University, is the lead faculty expert on the ITAG panel. Specific questions relevant to the content components of the alignment can be addressed to him at [speckere@MiamiOH.edu](mailto:speckere@MiamiOH.edu) with a carbon copy to Nikki Wearly ([nwearly@highered.ohio.gov](mailto:nwearly@highered.ohio.gov)).

Survey responses left in the form of comments will also be reviewed by the members of the ITAG panel.

We thank you in advance for your valuable input.

### \* 1. Demographic Information about the person completing this survey

Name

Institution

Department

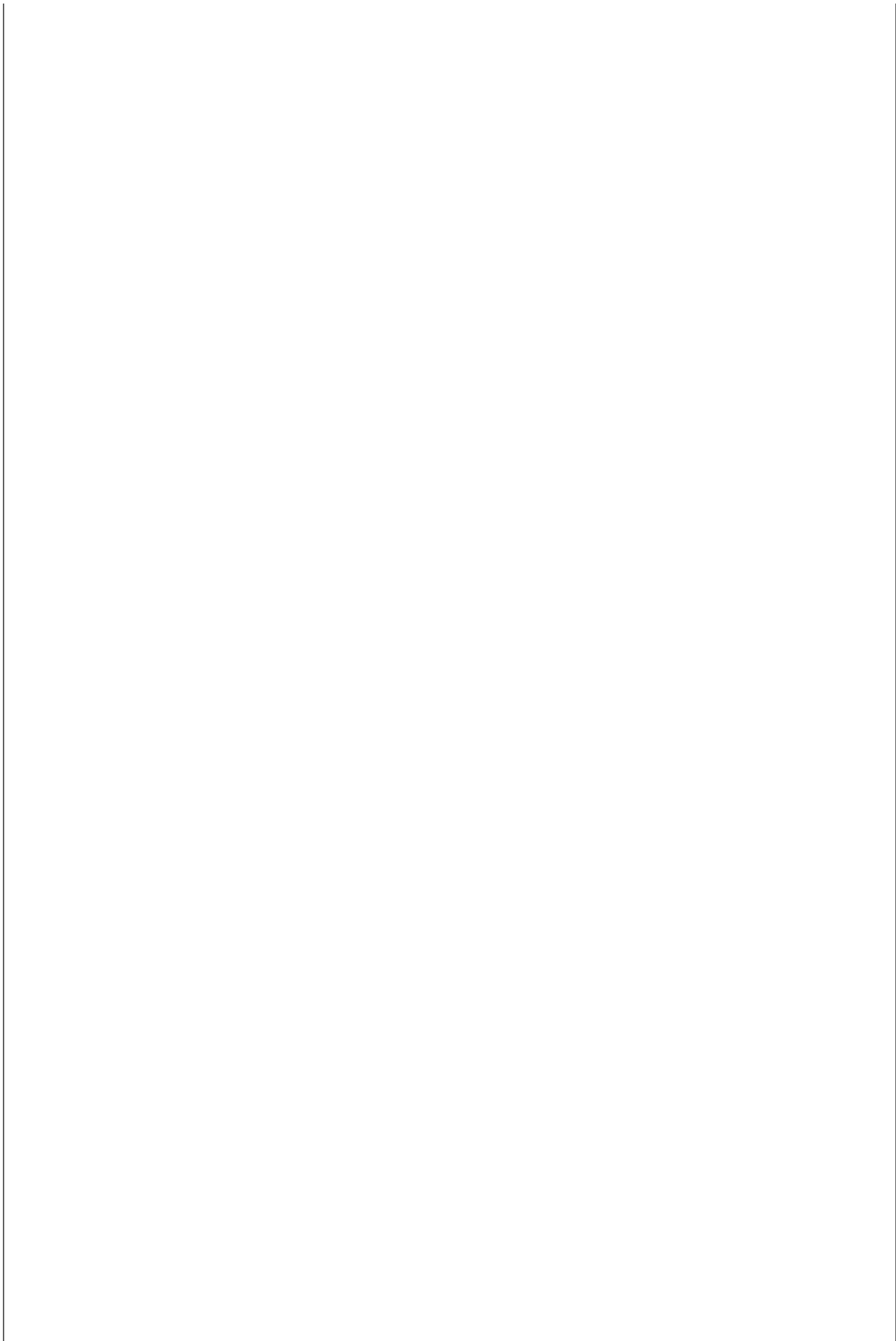
Title

E-mail

Phone

### \* 2. Please indicate the type of institution that you represent

- ☐ University
- ☐ Regional Campus
- ☐ Community College



## 2. PLC Curriculum

\* 3. Does your institution offer one or more courses in Electrical Engineering Technology with a focus on Programmable Logic Controllers?

☐ Yes

☐ No

## 3. Alignment

**Please read through the template below.**

**Programmable Logic Controllers ITAG: Documentation of Credential and Alignment**

<b>Credential Name:</b>	Siemens SCE Certificate in Automation and Certificate in Advanced Automation Rockwell Automation Studio 5000 Logix Programmer Certificate Mitsubishi Electric PLC & HMI
<b>Credential Type:</b>	X Certification <input type="checkbox"/> License
<b>Issuer of Credential:</b>	Siemens; Rockwell Automation; Mitsubishi
<b>Frequency of Updates:</b>	
<b>Exam(s) Required:</b>	<p>Siemens SCE Certificate in Automation and Certificate in Advanced Automation: SCE Automation Fundamentals Certification Test for Students: PLC (all 3 parts) SCE Advanced Automation Fundamentals Certification Test for Students: PLC (all 5 parts) <a href="https://new.siemens.com/us/en/products/automation/systems/sce/certificates.html">https://new.siemens.com/us/en/products/automation/systems/sce/certificates.html</a></p> <p>Rockwell Automation Studio 5000 Logix Programming Certificate: Logix Programmer Assessment (upon completion of the four courses in the curriculum) <a href="https://literature.rockwellautomation.com/idc/groups/multi_media/documents/multimedia/files/virtualbrochure/training-catalog/certificate-programs/logix-programmer/traditional-path">https://literature.rockwellautomation.com/idc/groups/multi_media/documents/multimedia/files/virtualbrochure/training-catalog/certificate-programs/logix-programmer/traditional-path</a></p> <p>Mitsubishi Electric PLC &amp; HMI An overview of the program and exam, along with proprietary sample materials from the credentialing exam, have been made available for ITAG reviewers here: <a href="https://drive.google.com/drive/folders/1kc32kBBIODIRQUNZBj23EwEHxpa79D5b?usp=sharing">https://drive.google.com/drive/folders/1kc32kBBIODIRQUNZBj23EwEHxpa79D5b?usp=sharing</a></p>

<b>Additional Requirements:</b>	N/A
<b>Current CTAG/TAG:</b> (if applicable)	TAG (OET022): <a href="https://www.ohiohighered.org/sites/ohiohighered.org/files/uploads/transfer/document%20s/TAG/FINAL%20Learning%20Outcomes%20for%20Programmable%20Logic%20Controllers%205-31-17.pdf">https://www.ohiohighered.org/sites/ohiohighered.org/files/uploads/transfer/document%20s/TAG/FINAL%20Learning%20Outcomes%20for%20Programmable%20Logic%20Controllers%205-31-17.pdf</a>
<b>Description of content to be evaluated and aligned:</b>	
<b>How long after attainment can credit be awarded?</b>	2 Years
<b>How can receiving institutions verify credential attainment?</b>	Student must provide proof of certification.

**Course Name:** Programmable Logic Controllers

**Credit Hours:** 3

**Course Description:** This course includes the principles and application of Programmable Logic Controllers including ladder logic, program control, data manipulation, math instructions, sequencers, shift registers, networking, PLC-mechanism interfacing and human-machine interfacing. Students will install, program, and document PLCs used in a variety of applications. The course will include advanced control circuits, advanced design of ladder and wiring diagrams to meet a given set of criteria, PLC programming, development of a human-machine interface, and data transfer in PLC networks. Must include hands-on labs.

Postsecondary Learning Outcomes	Credential Content: Siemens SCE Certificate in Automation and Certificate in Advanced Automation	Credential Content: Rockwell Automation Studio 5000 Logix Programmer Certificate	Credential Content: Mitsubishi Electric PLC & HMI
1. Recall the history of control systems and programmable logic controllers (PLCs).*	Identify the major components of a PLC and describe their functions	Basic Programming	Understand and establish basic knowledge of PLC programming for Mitsubishi PLCs
2. Explain and describe the use of number systems.*	Data types; A to D conversion	Basic Programming	Be able to perform basic PLC operations Become familiar with Mitsubishi PLC software GXWorks2 (how to connect to a plc system directly, via a HMI, via a network). Learn how to create/modify, monitor and save programs. Troubleshoot Mitsubishi PLC's

3. Demonstrate the use of ladder logic programming devices.*	Read a basic ladder logic diagram and statement list	Basic Programming	Be able to perform basic PLC operations Become familiar with Mitsubishi PLC software GXWorks2 (how to connect to a plc system directly, via a HMI, via a network). Learn how to create/modify, monitor and save programs. Troubleshoot Mitsubishi PLC's
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4. Employ ladder logic in control circuit design.*	Read a basic ladder logic diagram and statement list	Basic Programming	Be able to perform basic PLC operations Become familiar with Mitsubishi PLC software GXWorks2 (how to connect to a plc system directly, via a HMI, via a network). Learn how to create/modify, monitor and save programs. Troubleshoot Mitsubishi PLC's
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5. Use addressing to control Input/Output (I/O) modules.*	Connect a simple discrete input and output to an S7-200  Select the proper expansion module for analog inputs and outputs	Allen Bradley Structured Text Programming	Understand and establish basic knowledge of PLC programming for Mitsubishi PLCs
6. Demonstrate the use of relays, contacts, coils, and timers.*	Describe the operation of timers and counters	Allen Bradley Sequential Function Chart Programming:	Be able to create plc programs using many advanced functions (counters, timers, data registers, mov commands, comparisons, arithmetic instructions, master control)

7. Demonstrate counters and sequencers.*	Describe the operation of timers and counters	Allen Bradley Function Block Programming:	Be able to create plc programs using many advanced functions (counters, timers, data registers, mov commands, comparisons, arithmetic instructions, master control)
8. Demonstrate fundamental PLC programming (e.g., comparators, block transfers, I/O forcing).*	Basic network communications between PLCs, HMIs, and distributed IO	Allen Bradley Function Block Programming:	Be able to design screens on HMI (push buttons, lights, numerical display and input, templates, simple animation)
9. Demonstrate data transfer in PLC networks.*	Basic network communications between PLCs, HMIs, and distributed IO	Allen Bradley Sequential Function Chart Programming:	Be able to connect HMI to PLC (serial, Ethernet, bus)

\* 4. Do you agree that the content of the Siemens SCE Certificate in Automation and Certificate in Advanced Automation listed in the second column in the template aligns with the learning outcomes listed in the left-hand column that were taken from the TAG course, Programmable Logic Controllers?

To be eligible to receive college credit for the PLC course, students would need to hold BOTH the Certificate in Automation and the Certificate in Advanced Automation.

You can find more details about these certificates on [this page](#).

☐ Yes

☐ No

If you feel there was a major omission in the content to support a learning outcome, please indicate.

\* 5. Do you support the awarding of 3 semester credit hours toward the PLC course for students who provide proof of holding both the Siemens SCE Certificate in Automation and the Siemens SCE Certificate in Advanced Automation credentials, regardless of where the student learned the content to pass the credentialing exams?

☐ Yes

☐ No

If no, please explain.

\* 6. Do you agree that the content of the Rockwell Automation Studio 5000 Logix Programming Certificate listed in the third column in the template aligns with the learning outcomes listed in the left-hand column that were taken from the TAG course, Programmable Logic Controllers?

To be eligible to complete the credentialing assessment, students would need to complete all four courses in this curriculum.

You can find more details about this program on [this page](#).

☐ Yes

☐ No

If you feel there was a major omission in the content to support a learning outcome, please indicate.

\* 7. Do you support the awarding of 3 semester credit hours toward the PLC course for students who provide proof of holding the Rockwell Automation Studio 5000 Logix Programming Certificate, regardless of where the student learned the content to pass the credentialing exam?

☐ Yes

☐ No

If no, please explain.

\* 8. Do you agree that the content of the Mitsubishi Electric PLC & HMI program listed in the right-hand column in the template aligns with the learning outcomes listed in the left-hand column that were taken from the TAG course, Programmable Logic Controllers?

An overview of the content of this program, including the nature of the final exam that serves as the credentialing exam, is included below. Proprietary materials from the course and exam have been made available by the program director for the purposes of review for ITAG endorsement. Those materials can be found on [this page](#).

☐ Yes

☐ No

If you feel there was a major omission in the content to support a learning outcome, please indicate.

Mitsubishi Electric Automotive  
PLC Training and Assessment  
Length of Training: 120 hours

**Table of Contents:**

- Objectives
- What is a PLC
- Q Series Hardware
- Number Systems
- System Configuration
- Memory Allocation
- FX Trainer Introduction
- PLC Sinking vs Sourcing
- Programming Basics Reference
- GX Works 2 & Connecting CPU

**Objectives:**

- Be able to perform basic PLC operations
- Troubleshoot Mitsubishi PLC's
- Making changes in existing PLC's
- Have confidence & knowledge to perform these tasks alone
- Define differences between A-Series & Q-Series programming
- Understand and establish basic knowledge of PLC programming for Mitsubishi PLCs

**Assessments:**

In-class worksheets, quizzes and projects covering:

- Number systems
- I/O addressing
- Graphic Operator Terminal-HMI
- Application programming
- Counters and sequencers
- Encoders
- Math operations
- Multiple program structures

**Final Exam:**

This assessment is comprehensive and includes multiple in-class test questions and a complete hands-on system development—programming, wiring, and operation. Here is a portion of a typical final exam application:

*Create the following program:*

- *Make a program with 2 sections (main & a sub program) that can be selected to run by a “program number selection” numerical input on the GOT.*
- *Program 1;*
- *When both cylinders 1 & 2 are in the reverse position, this will be start position. “Start position” light should be illuminated only when both cylinders are in reverse.*

*When “Auto” is selected (“auto” should light) and “Auto Start” is pushed (“auto start” should light), cylinder 1 goes fwd until end is reached, wait 1 second and rev until end is reached. Wait 1 second and cylinder 2 goes fwd until end is reached, wait 1 second and rev until end is reached (this is 1 cycle).*

*Wait 1 second and start with cylinder 1 again indefinitely or until the “Reverse” button is pressed. When “reverse” button is pressed, stop the sequence after cylinder 2 has reversed.*

*“Reverse” light should be blinking only while waiting on sequence to end. When sequence ends, “reverse” light stops blinking, “Auto start” light goes off and “start position” light illuminates (when both cylinders are in reverse states) and “Auto” light stays illuminated.*

*NOTE: Make sure to include cylinder sensors in your program.*

**For more details, please contact:**

John Henry, [JHenry@meaa.mea.com](mailto:JHenry@meaa.mea.com)

Training and Development

Mitsubishi Electric Automotive

4773 Bethany Road

Mason OH 45040

P: (513) 398-2220

F: (513) 398-1121

\* 9. Do you support the awarding of 3 semester credit hours toward the PLC course for students who provide proof of having successfully completed the Mitsubishi Electric PLC & HMI program and having passed the credentialing exam?

☐ Yes

☐ No

If no, please explain.

\* 10. Do you support the creation of an ITAG for the proposed three credentials (also listed below) based upon the Programmable Logic Controllers TAG course?

- Siemens SCE Certificate in Automation and Certificate in Advanced Automation
- Rockwell Automation Studio 5000 Logix Programmer Certificate
- Mitsubishi Electric PLC & HMI

☐ Yes

☐ No

If no, please explain.

4. PLC Course

\* 11. Does your institution offer a course that aligns to the approved learning outcomes for the PLC TAG course, as listed in the left-hand column of the alignment template on the previous page?

☐ Yes

☐ No

5. PLC Course

\* 12. What is the course name and number of your PLC course?

\* 13. How many credit hours are awarded for this course?

\* 14. For which of the following credentials does your institution award credit for the course listed above to students who hold them? Please mark all that apply.

- ☐ Siemens SCE Certificate in Automation and Certificate in Advanced Automation
- ☐ Rockwell Automation Studio 5000 Logix Programmer Certificate
- ☐ Mitsubishi Electric PLC & HMI
- ☐ None of the above

If your institution awards credit for any of these credentials, please describe the Prior Learning Assessment (PLA) process at your school for applying the credential to meet the credit hours for your PLC course.

6. Additional Comments

15. Are there additional comments that you would like to make about the proposed ITAG for PLC?

7. Thank You!

**Thank you for completing this survey.**

**If you have any questions regarding this survey, please contact Nikki Wearly at [nwearly@highered.ohio.gov](mailto:nwearly@highered.ohio.gov).**